

Southern Fine Particulate Monitoring Project

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 - ◆ Jefferson County Health Department
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Fine Particle Monitoring Project Approach

- Collaboration With Existing Programs Using North Birmingham Site (Jefferson County, SEARCH)
- Continuous Monitoring of Ambient Fine Particulate Mass, Composition, and Key Properties (Including Particle Size Distribution)
- Particulate Measurement Technique Development, Evaluation (Sulfate monitors)
- Apply high time resolution data to local and mid-range source attribution models (PMF variants)
- Evaluate time/transport properties of fine PM, and implications for management strategies for PM_{2.5}

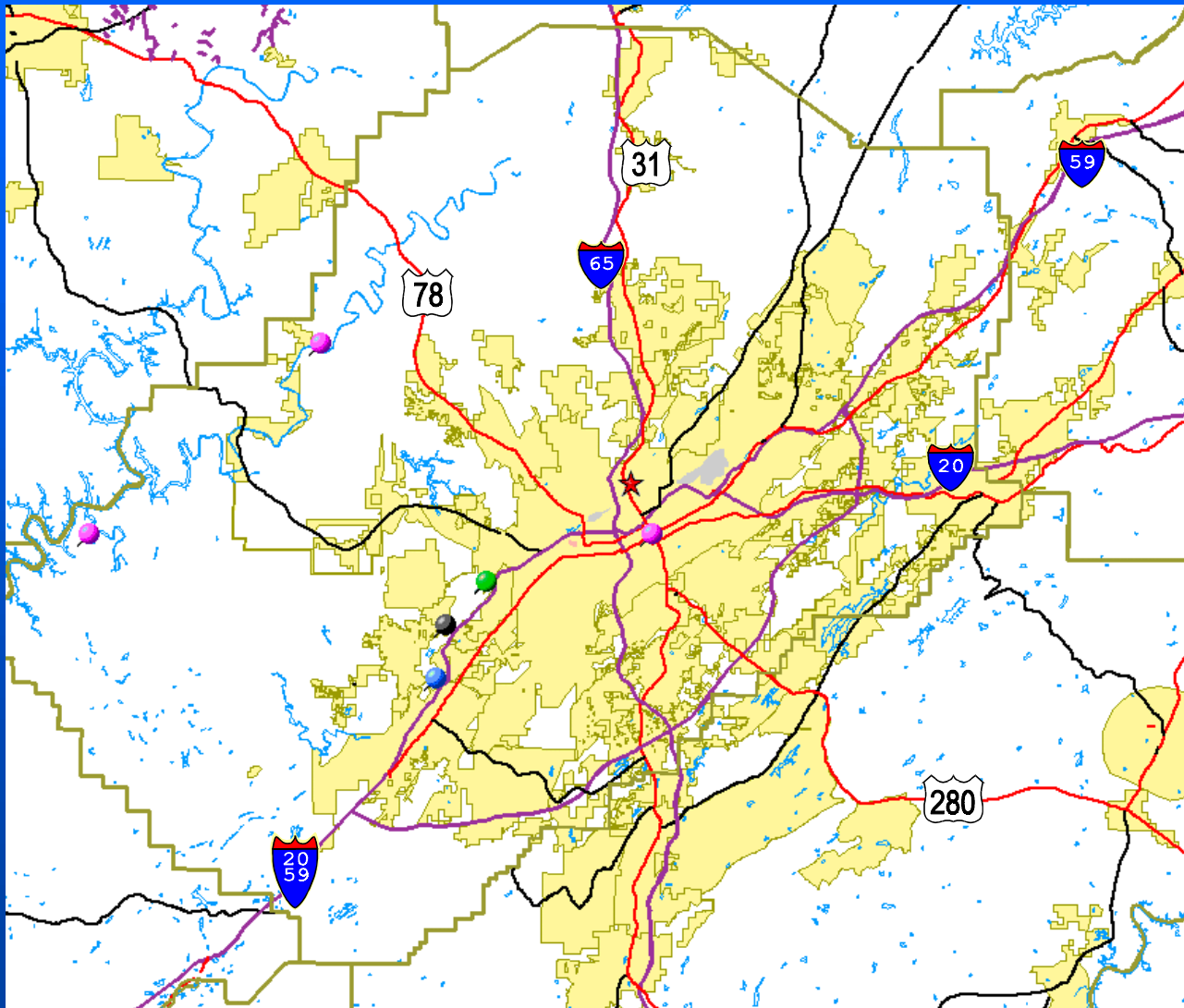


Features of Birmingham Airshed

- Nonattainment for O_3 , $PM_{2.5}$
- Southeastern climate
 - high “regional” $PM_{2.5}$ relative to source
- Ridge/valley topology and meteorology
 - local transport, mixing patterns
- Fewer major upwind regional sources
 - directional signatures possible
- Distinctive local source mix
 - mobile, metallurgical, vegetative



Birmingham Metropolitan Area



North Birmingham
Monitoring Site



Iron Foundries



Power Plant



Steel Mills



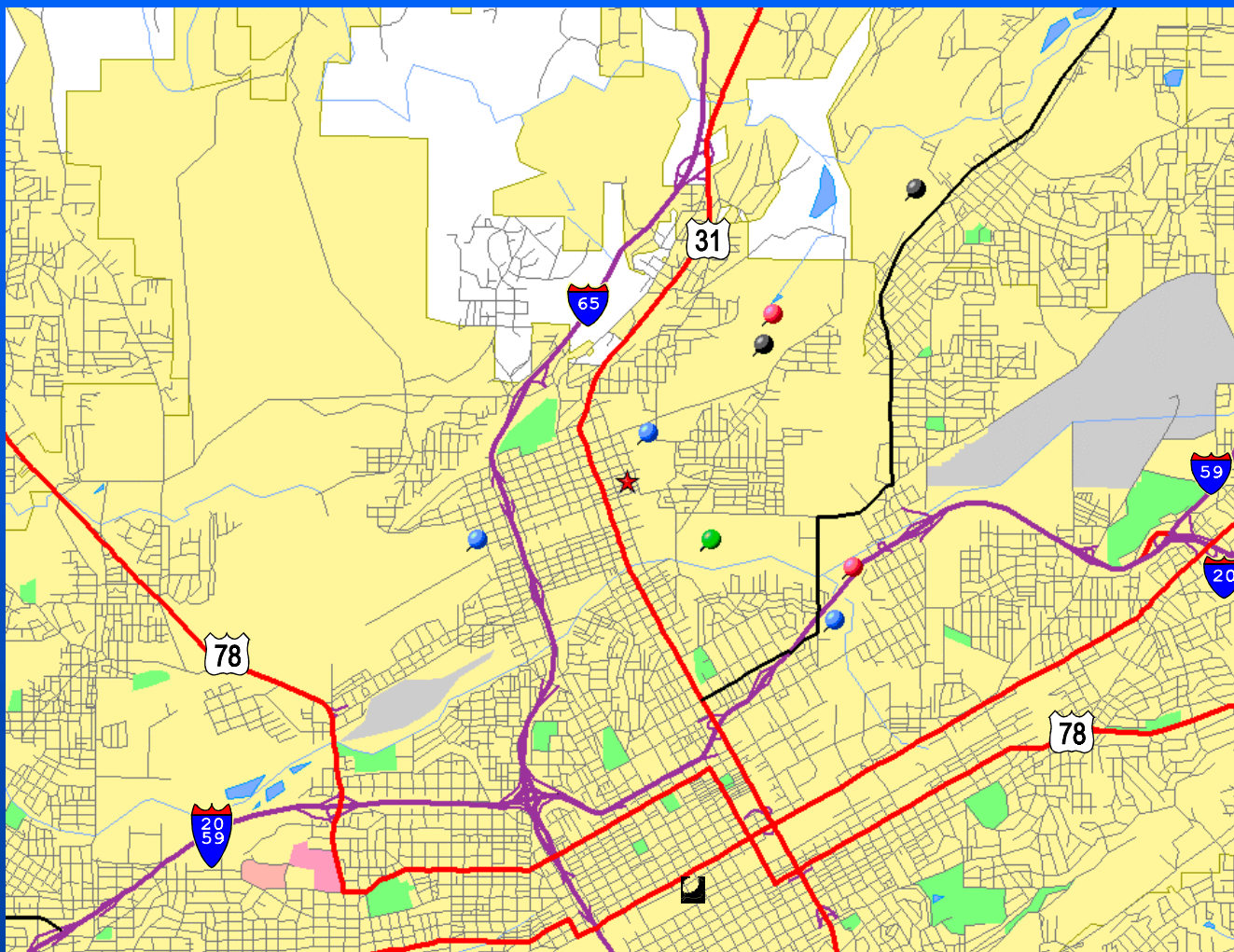
Coke Plants



Mineral Wool Plants



North Birmingham



North Birmingham
Monitoring Site



Iron Foundries



Power Plant



Steel Mills



Coke Plants



Mineral Wool Plants



North Birmingham Monitoring Site

- EPA PM NAMS (Since 1974)

Operated by Jefferson County Department of Health

PM_{2.5} - FRM and TEOM (50°C)

PM₁₀ - FRM and TEOM (50°C)

PM_{2.5} Speciation Trends Site

(Non Regulatory) O₃ Monitor on loan

- SEARCH Urban Site (Since 10/1998)

Operated by Atmospheric Research Associates

PM Filter Samples - FRM, PCM, Dichotomous

Particulate Carbon - Aethelometer, R&P 5400

Continuous Gases - CO, SO₂, NO_x, NO_y, ...

Meteorology



North Birmingham Monitoring Site

- Southern Research Institute (Since 2/2000)

TSI APS and SMPS

PM2.5 TEOM - 30 °C, Dry

PM2.5 Nephelometer - 25 °C, Dry

R&P 8400S Sulfate Monitor

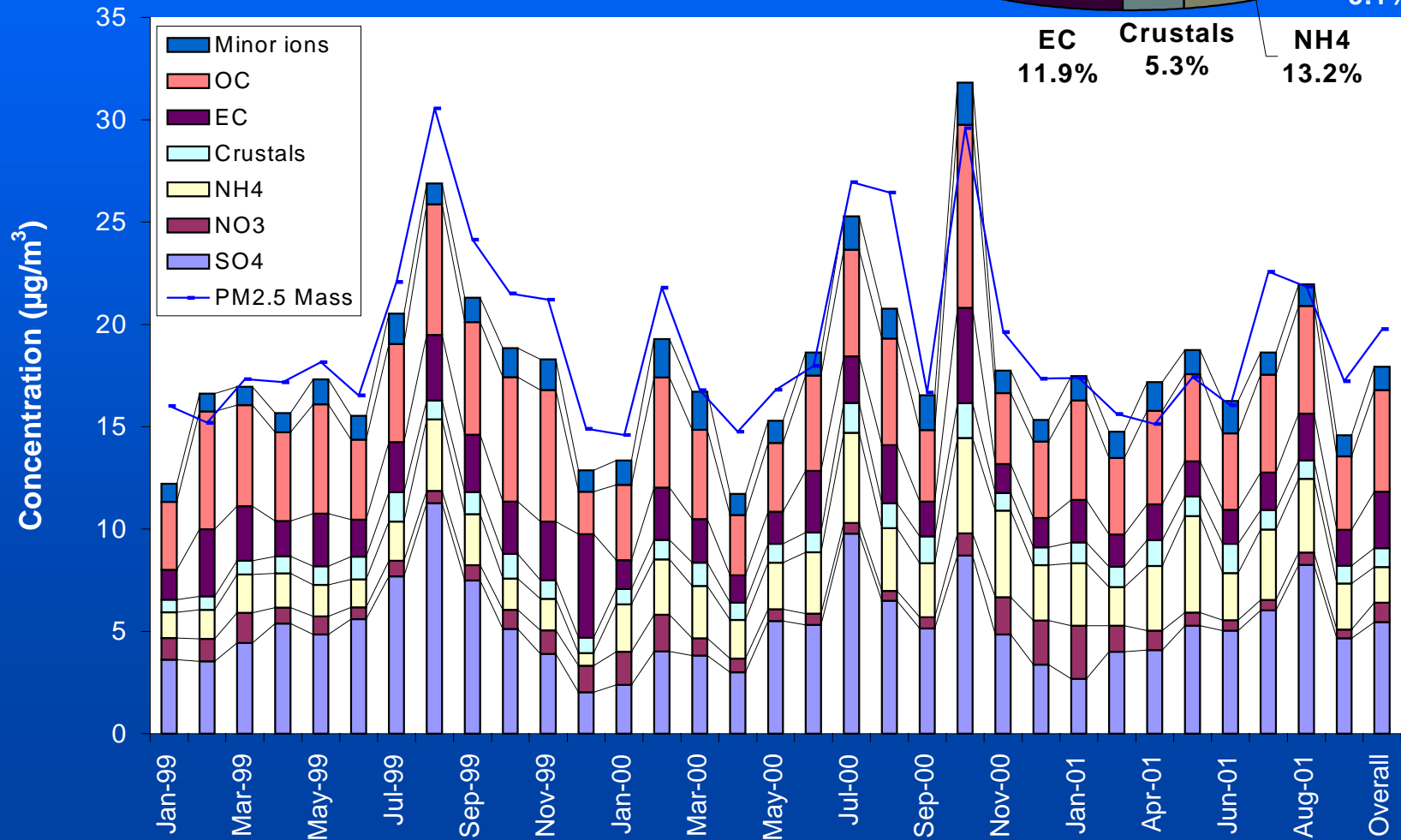
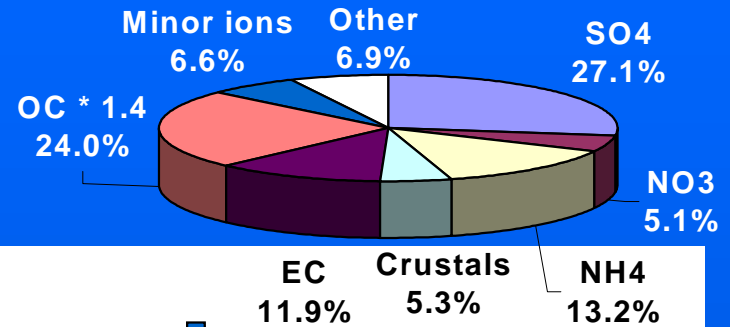
Sulfate Monitor - Harvard School of Public Health Design



North Birmingham Monitoring Site

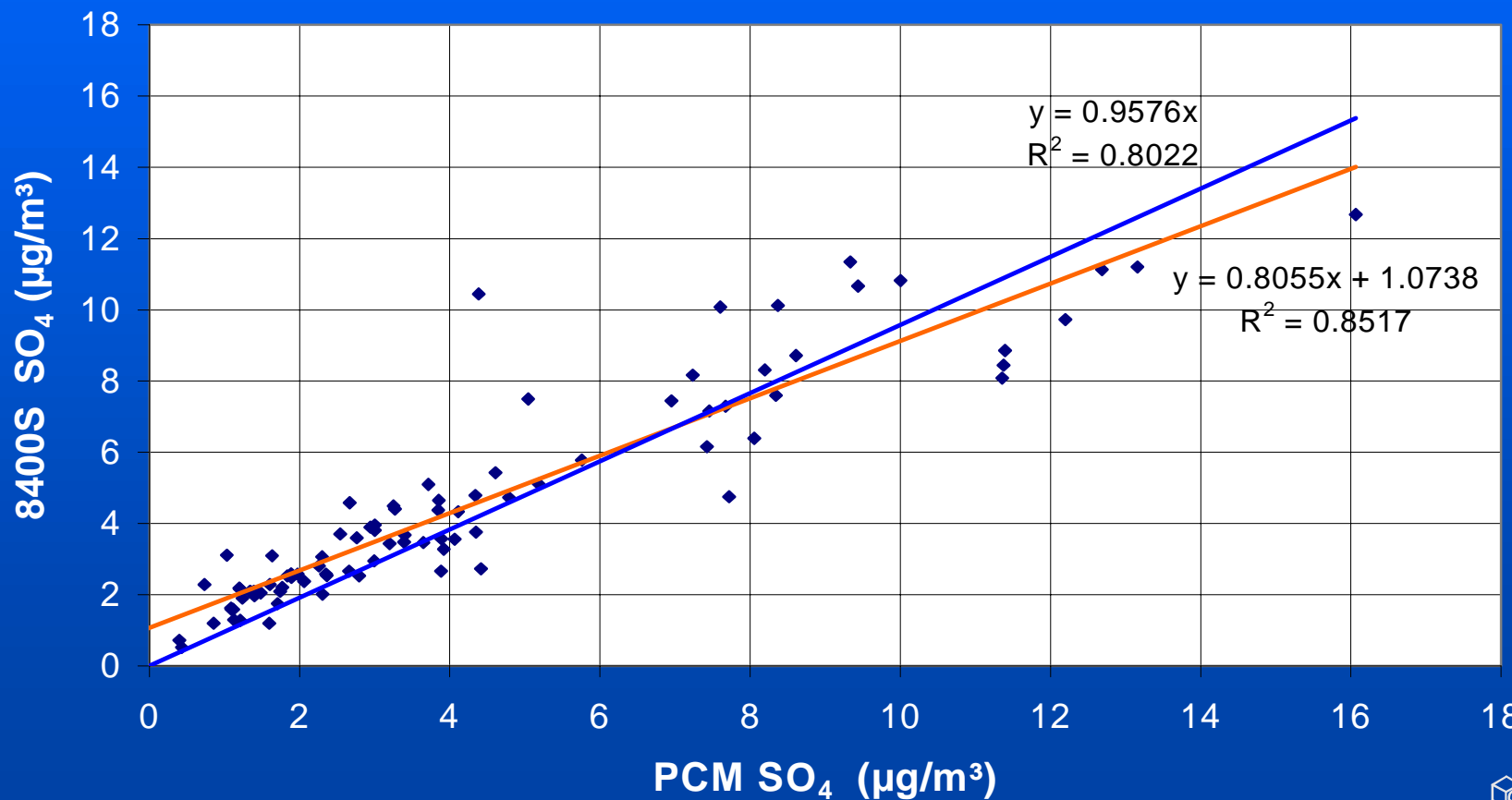


Birmingham Particulate Matter Composition

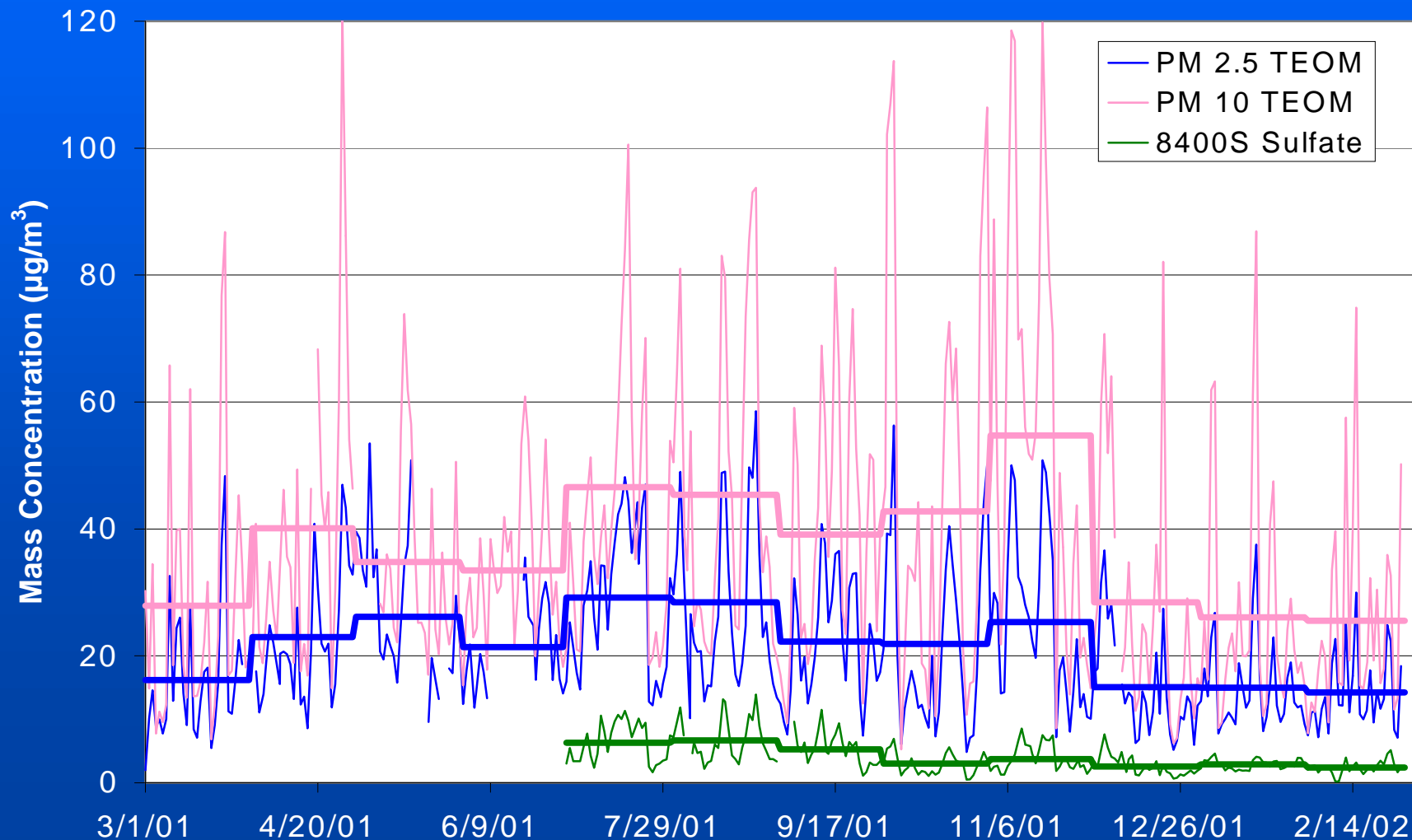


Sulfate Monitor Evaluation

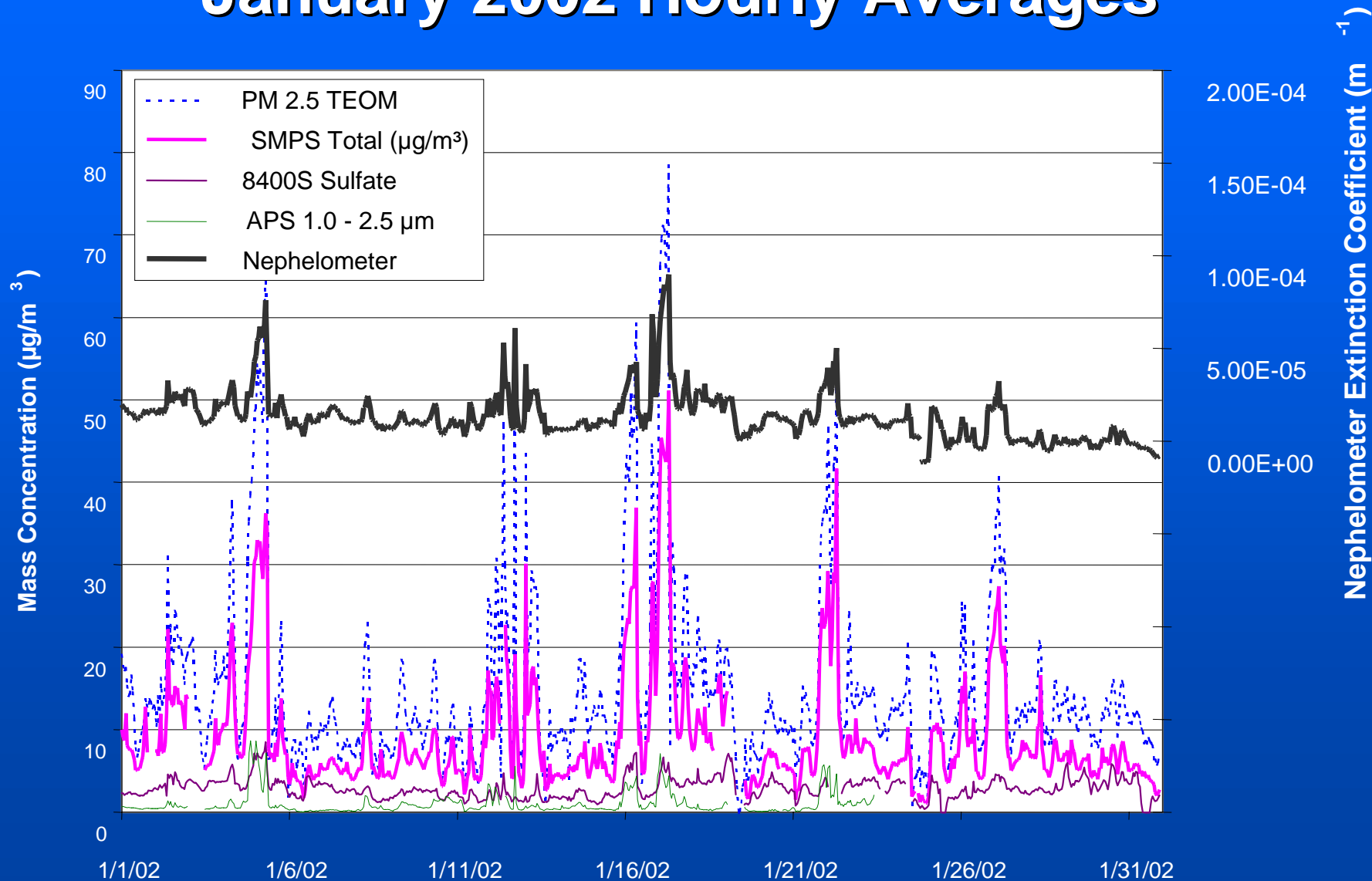
8400S SO₄ Concentration vs. PCM SO₄ Concentration
June 30, 2001 - January 21, 2002



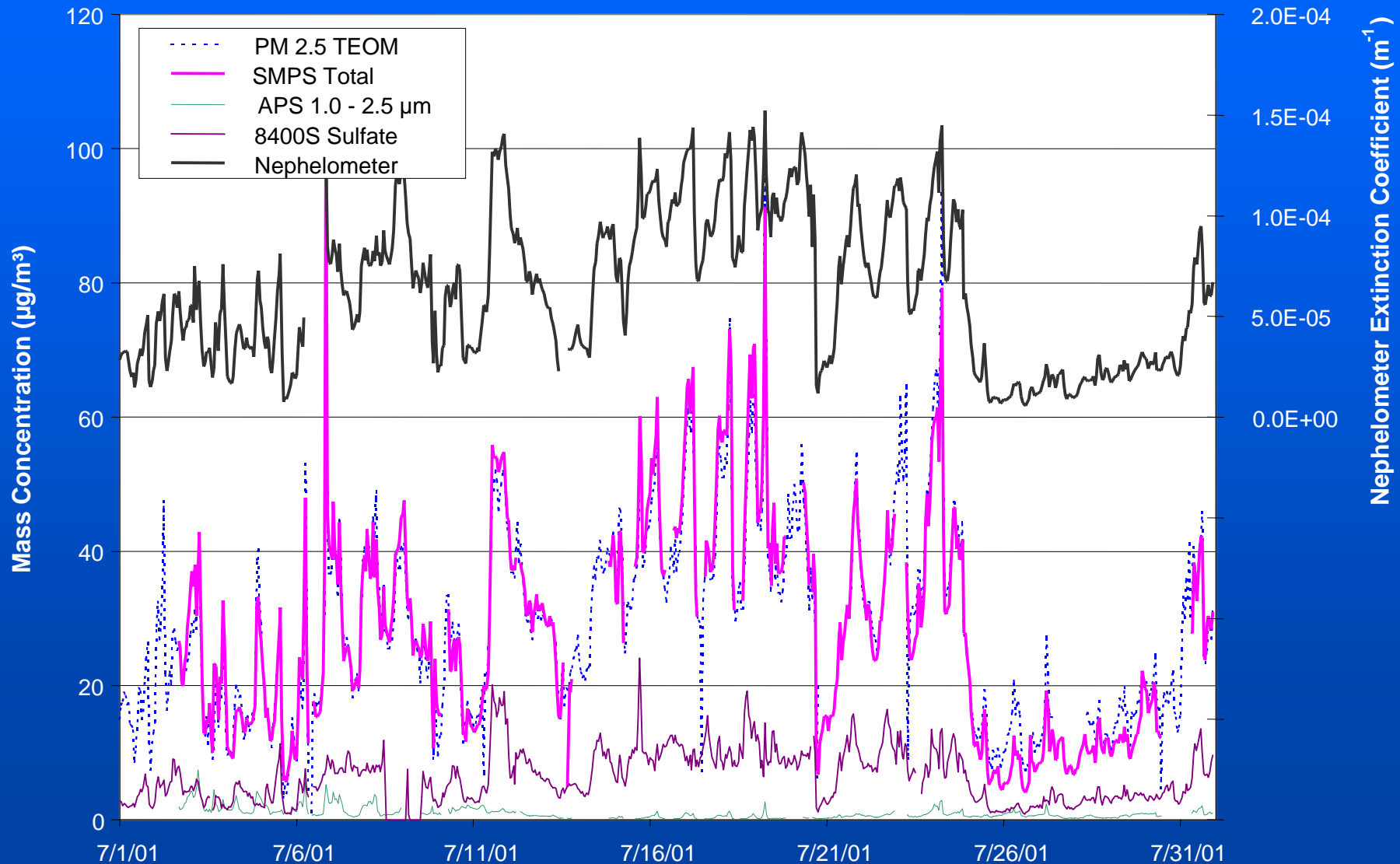
Daily and Monthly Concentration Averages in North Birmingham



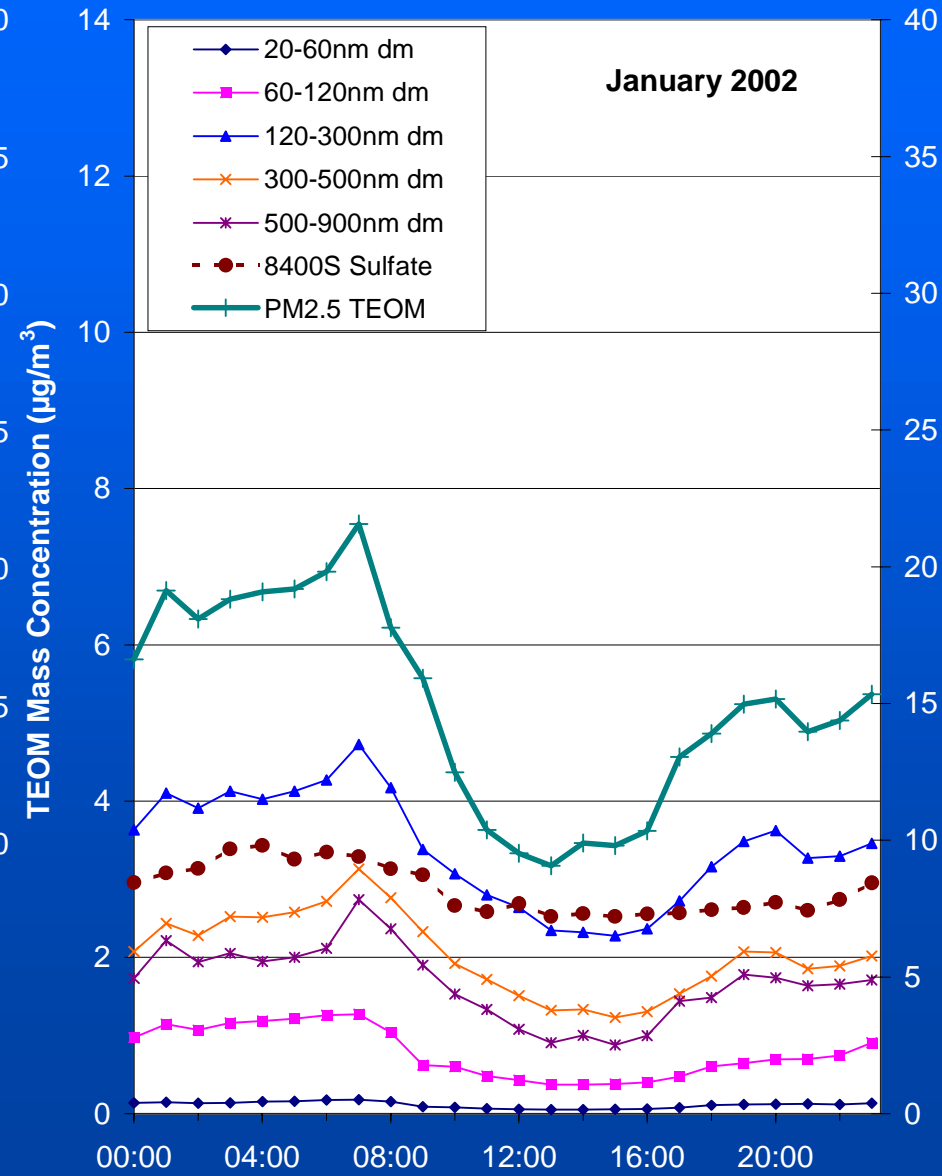
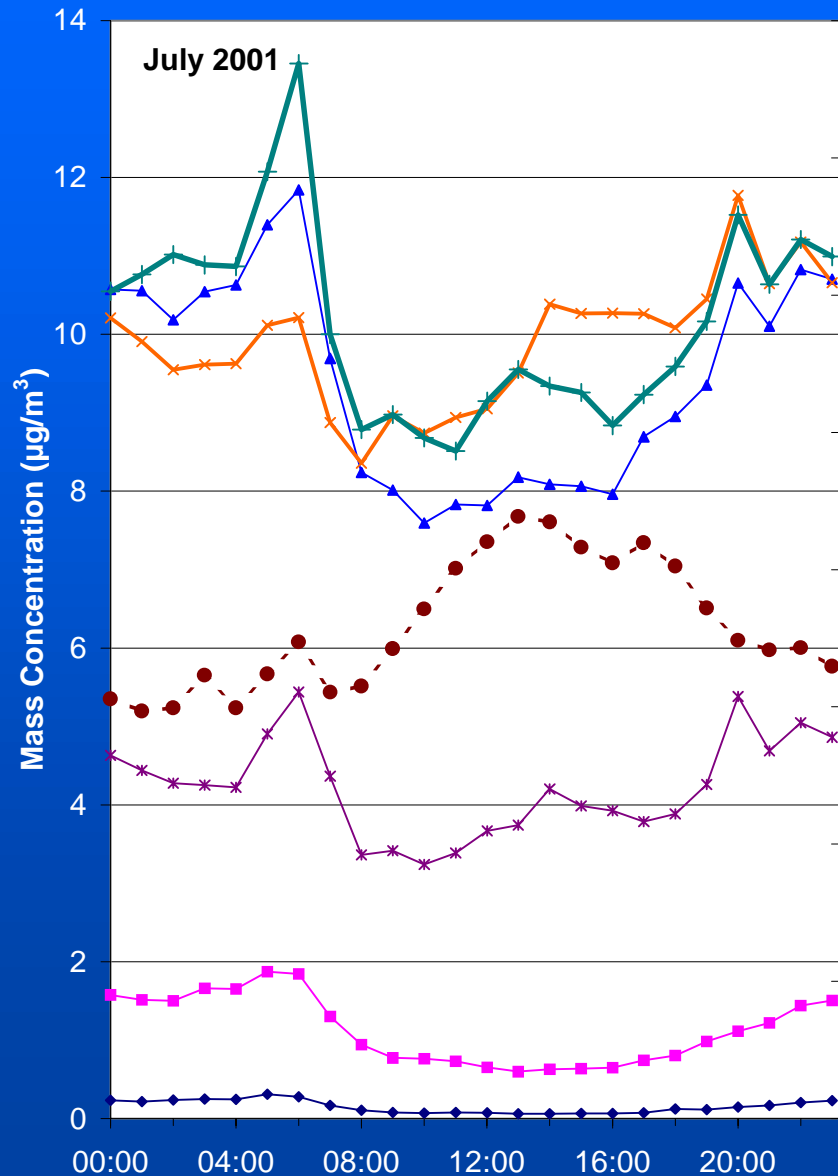
January 2002 Hourly Averages

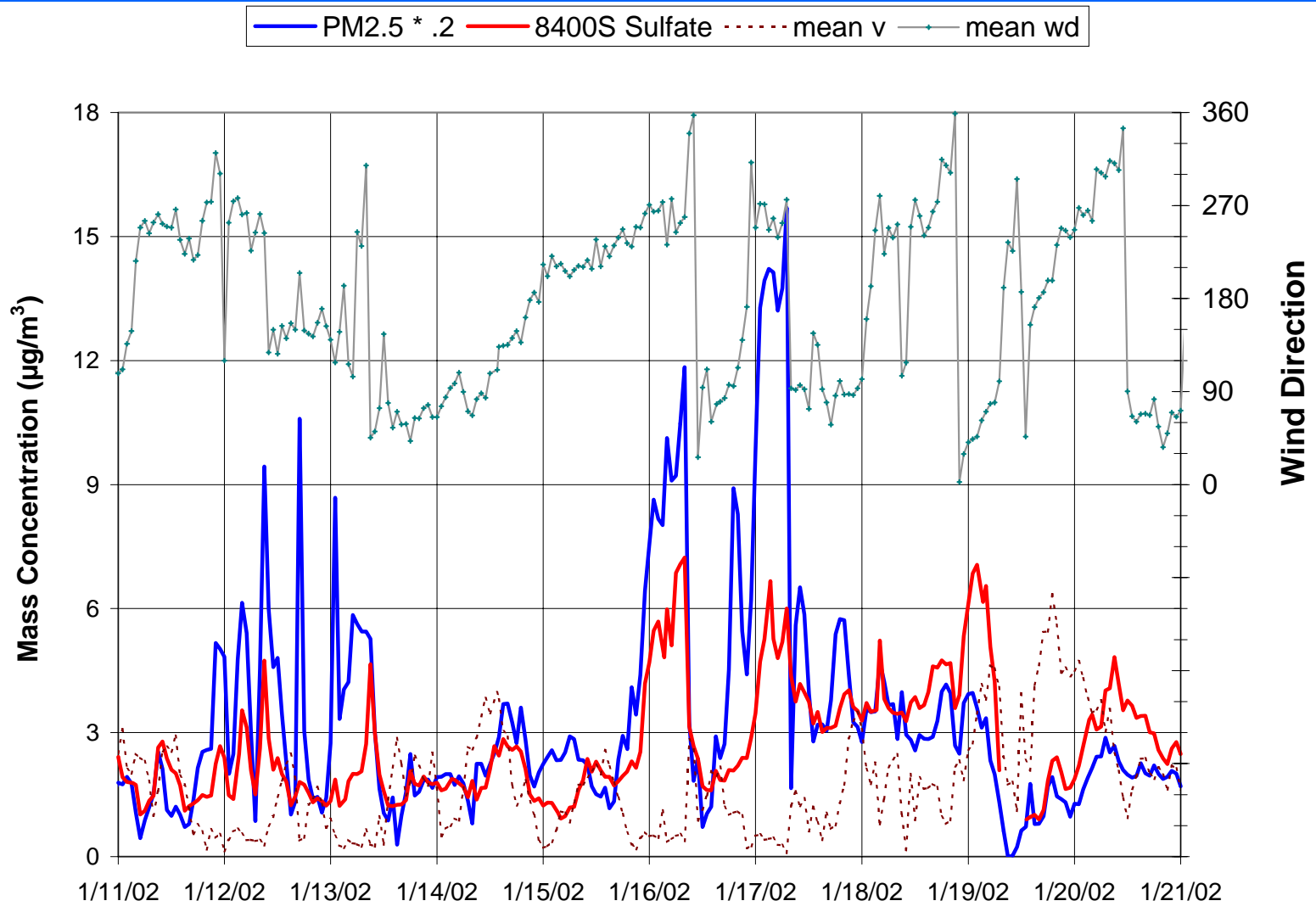


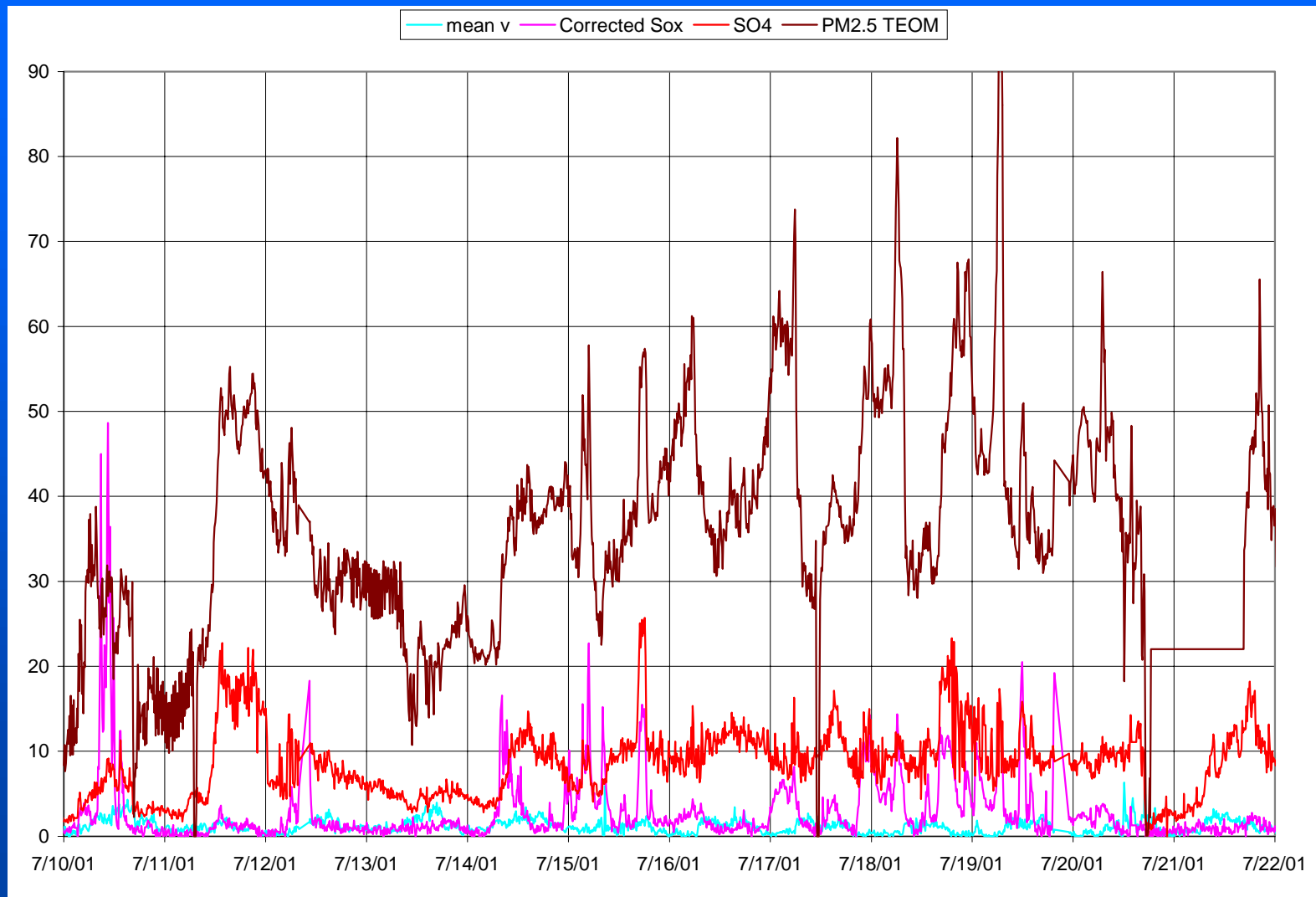
July 2001 Hourly Averages



Time of Day Concentrations







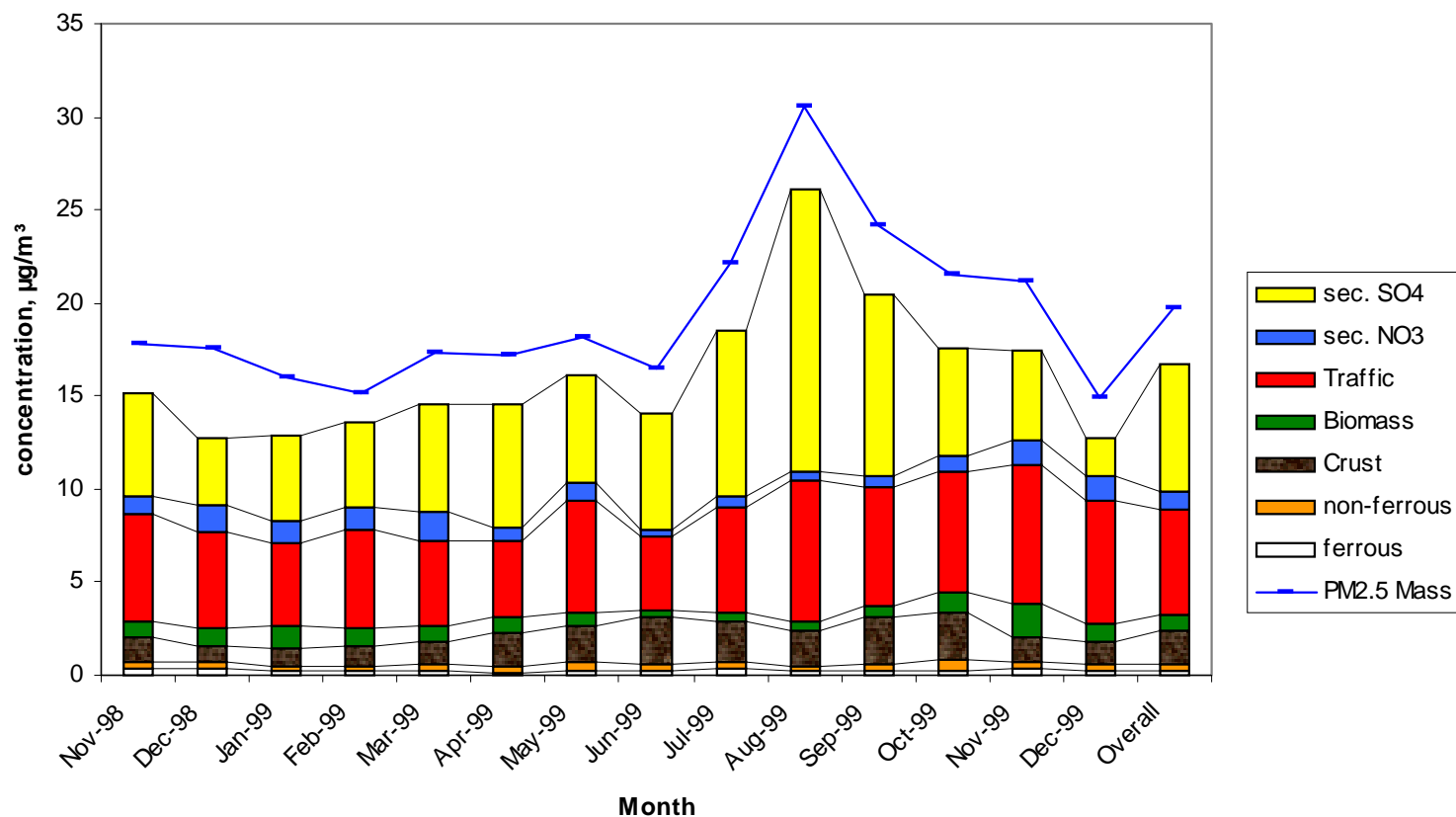
PM Source Attribution Studies

- Positive Matrix Factorization (PMF) and extensions:
 - ◆ 24 hr filter samples, 1999 - 2001 data
 - ◆ Extend model with Met variables, Coarse PM
 - ◆ Incorporate continuous mass, met, size, composition data into treatment
- Separate treatment of local, regional PM sources
 - ◆ Real-time Data “Fingerprint” extraction
 - ◆ Back trajectory, Potential Source Contribution Function (PSCF) analysis
 - ◆ Dispersion Analyses for targeted sources to verify



Birmingham Particulate Matter Composition

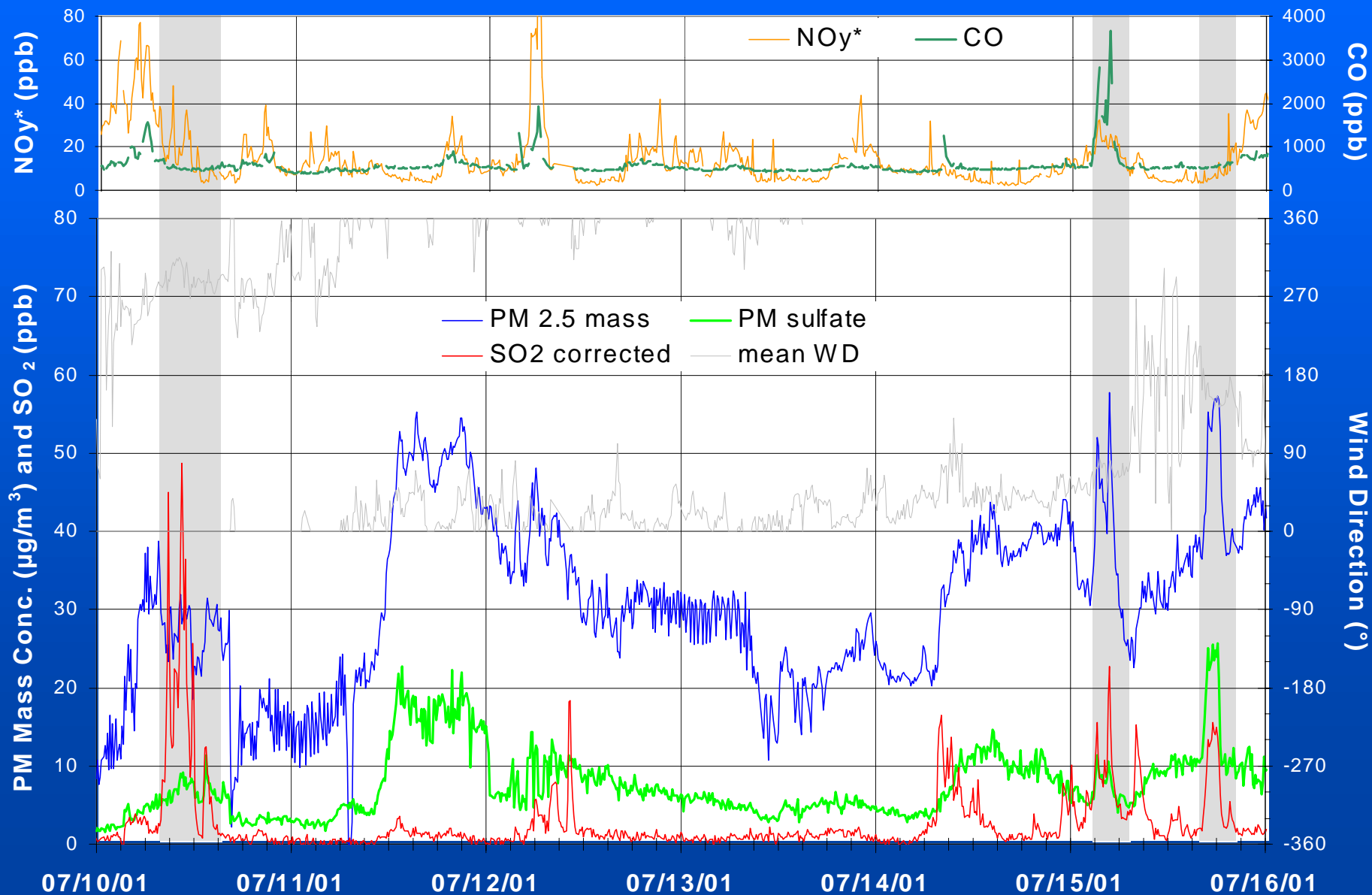
PM2.5 average composition - by factor



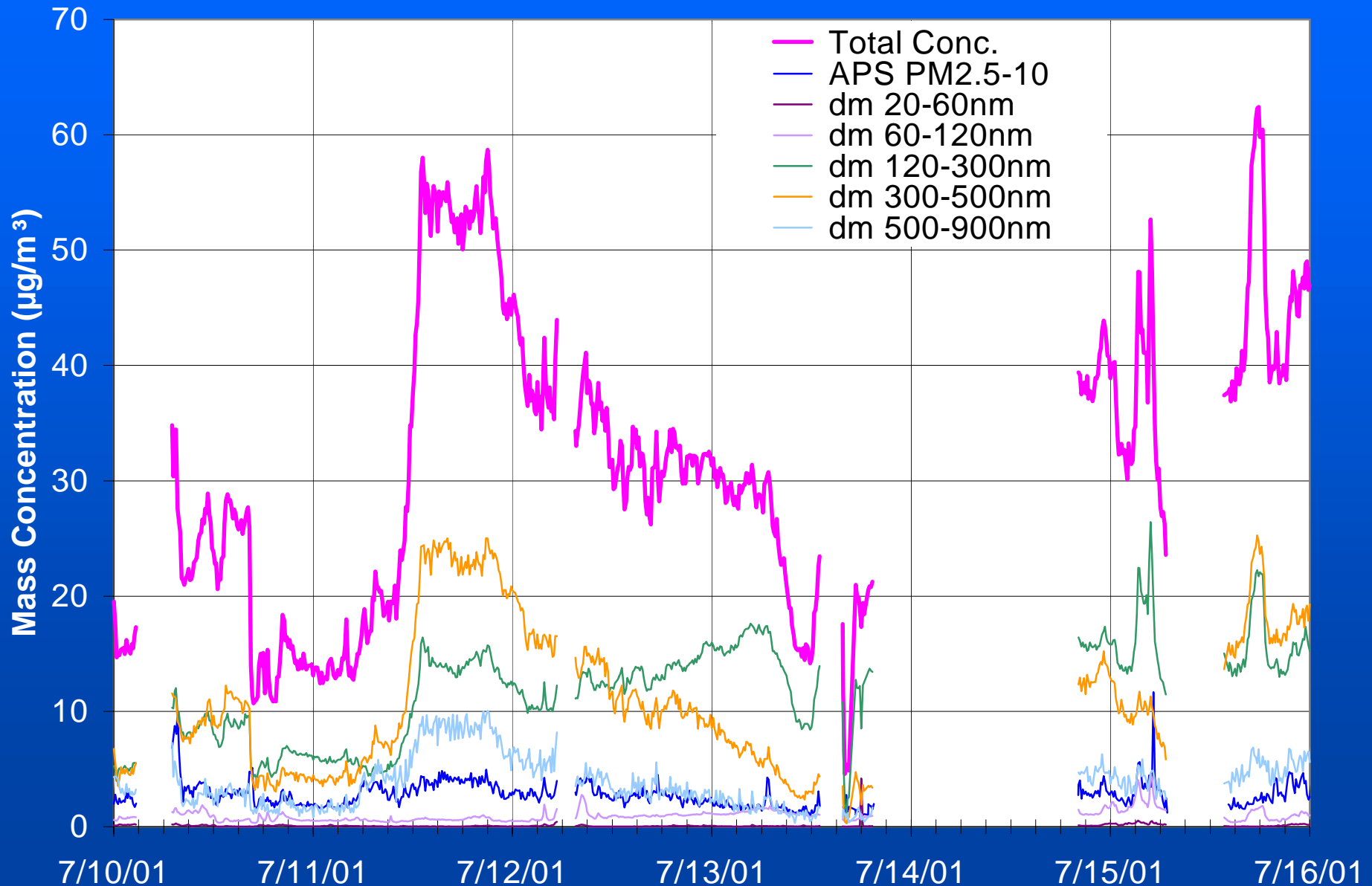
From SEARCH PCM Data



July 2001 Episodes



July Episodes Particle Size Distribution



Event Size Distributions

